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A CLIMATE-RESPONSIVE GREEN BUILDING FRAMEWORK FOR GHANA: INTEGRATING MITIGATION AND ADAPTATION STRATEGIES

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ABSTRACT

Purpose: This research aims to develop a comprehensive framework for implementing climate-responsive green building practices in Ghana that effectively integrates mitigation and adaptation strategies. The objectives are: to develop a multi-level implementation framework that bridges policy intentions with practical applications, providing clear pathways for adopting green building practices across different building types and scales in Ghana; and to validate the proposed framework through stakeholder engagement and expert evaluation.

Design/Methodology/Approach: The research design was based on qualitative and non-probability techniques used to gather information for the study, and the sample size was 17. The interviews were conducted face-to-face or online. This study also used a narrative style to analyse the data.

Findings: The study found that despite the country's efforts, there was limited or no coordination between the various players in the Built environment and other sectors of the economy, resulting in the non-existence of a long-term national strategy for climate change adaptation and mitigation. The paper thus focuses on the need for Ghana to incorporate the Green Building concept as one of its climate change mitigation and adaptation strategies.

Research Limitation: This study is limited to how policy interventions toward climate change mitigation and adaptation can significantly help to improve energy and material use efficiency, conservation drive, and end-use wastage.

Practical Implication: Thus, developing a national strategy for green building construction has the potential benefit of helping to mitigate climate change challenges.

Social Implication: Educating policymakers on the potential benefits of adopting the Green Building Concept and developing an effective cross-cutting communication strategy to educate the citizenry on the benefits derived from the Green Building Concept as a low-hanging fruit towards GHG mitigation.

Originality/Value: This study innovatively explores how traditional Ghanaian building techniques and materials can be incorporated into modern green building practices.

Keywords: *Adapting. climate change. green building. mitigating. policy*
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INTRODUCTION

Climate change is here to stay with mankind, and it is time to make the necessary adjustments to mitigate its impacts (Nordhaus, 2019). Therefore, countries worldwide are taking steps to mitigate Climate change (Riahi et al., 2017).

Every building needs energy to function effectively, but energy provision in many countries continuously poses a challenge, partly because of the projected alarming rate of depletion of fossil fuel sources (Owusu & Asumadu-Sarkodie, 2016). Hostels are not exempt.

The concept of Net-Zero Energy buildings (NZEB) has received much attention in recent years. Torcellini & Pless (2011) stated that NZEB has become the centre of focus of many governments and organisations all over the world. Barry & Davidson (2015) defined NZEB in their study as "an energy efficient building or structure that produces sufficient energy on-site over a year to supply all expected on-site energy services for building users". Shehadi (2020) and Shehadi (2018) further commented that the concept of NZEB has great potential in transforming how buildings use energy whilst maintaining occupancy protection and comfort.

Ghana on the other hand has developed some policies in this regard which include; the National Climate Change and the National Climate Change Action Master Plan along with strategies such as the Ghana REDD+ Strategy; Ghana's Nationally Determined contributions (GH-NDC) towards the Paris climate Agreement; Ghana Plantation Strategy and Policy; and the National Climate Change Adaptation Strategy in response to climate change and variability (Ali et al., 2021). These documents, however, do not explicitly focus on the built environment. This means it would be prudent for Ghana to combine mitigation and adaptation measures to respond to climate change and variability.

Sharifi (2020) defined Mitigation as any action taken to eliminate or reduce the long-term risk and hazards of climate change, such as reducing GHG emissions. On the other hand, adaptation is an adjustment in natural or human systems in response to actual or expected climatic stimuli or effects, with moderate harm or exploiting beneficial opportunities (Kom et al., 2020).

Adaptation, thus, is an understanding of how individuals, groups, and natural systems can prepare for and respond to climate change. It is, therefore, crucial to reduce vulnerability to climate change. Thus, while Mitigation tackles the causes of climate change, Adaptation tackles the phenomenon's effects. The potential to adjust to minimise negative impact whilst maximising any benefits from climate change is an essential coping strategy. The primary aim of this research is to develop a comprehensive framework for implementing climate-responsive green building practices in Ghana that effectively integrates both mitigation and adaptation strategies. The objectives are: to develop a multi-level implementation framework that bridges policy intentions with practical applications, providing clear pathways for the adoption of green building practices across different building types and scales in Ghana; and to validate the

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proposed framework through stakeholder engagement and expert evaluation, ensuring its practical applicability, cultural appropriateness, and effectiveness in addressing Ghana's climate change challenges.

LITERATURE REVIEW

Green Building, called Green Construction, refers to using environmentally responsible features and resource-efficient materials throughout the building's life cycle during design implementation in structures, buildings, and commercial spaces (Owusu-Manu et al., 2023). That is, from planning to design, construction, operation, maintenance, renovation, and demolition (Raouf & Al-Ghamdi, 2023).

The concept often referred to as 'Sustainable Building' means that the building is designed to consume less energy, improve air quality, have low maintenance costs, be highly flexible in design, etc., without compromising the durability and strength of the building structure (Zhang et al., 2022).

Since continued emissions of greenhouse gases will cause further warming, leading to long-lasting changes in all components of the climate system, there is an increasing likelihood of severe, pervasive, and irreversible impacts for people and ecosystems. Limiting climate change would thus require substantial and sustained reductions in greenhouse gas emissions, which, together with adaptation, can mitigate climate change risks.

The Intergovernmental Panel on Climate Change (IPCC) aims to limit global warming to well below 2°C and pursue efforts to limit the temperature increase to 1.5°C. Its main activity is preparing reports assessing the state of knowledge of climate change (IPCC, 2022). Ohene et al. (2022) argued that advancing net-zero carbon emissions in buildings is important. A net-zero building uses energy efficiently throughout its lifespan.

The Net Zero Carbon concept is a highly energy-efficient building, with all remaining energy from on-site and/or off-site renewable sources (Weerasinghe et al., 2024). The Green Building Council estimates that 100% of buildings should operate at Net Zero Carbon in 2050. It further moves that all new buildings should incorporate the concept in 2030, as cited in Cohen et al. (2021).

These ambitious targets cannot be achieved without government engagement, training and education, policies, structures, and corporate training. Aside from these, the most important thing is for countries to remain committed to achieving them by implementing direct and indirect policies.

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Energy Efficiency and Conservation in Buildings in Ghana

Ghana began its energy efficiency and conservation programme in 1997 when the Energy Foundation (1999) was established. The Energy Foundation collaborates with the private sector to promote energy efficiency policies and programmes to ensure the efficient and sustainable development and use of Ghana's energy resources.

The Foundation rolled out a building energy management system, which was to conduct energy audits to determine the amount of energy being consumed and what ways can be used to save energy. Some selected public and commercial buildings were audited, and it was found that 25% of energy savings were achieved in 1999 during the project implementation in 1997. Also, industrial load management sought to reduce electricity consumption during peak demand and shift loads to off-peak periods. After a study on 30 industrial firms whose demand exceeded 500 kVA showed that 75 million Volt Ampere (MVA) of peak load demand could be saved from these firms (Ghana Grid, 2021). Therefore, the Time of Use (TOU) tariff was recommended to be introduced as an incentive to control the peak demand and shift loads to off-peak periods.

Over the years, the country has worked to find a solution to curb the energy demand from industries and commercial buildings. Unfortunately, even though some gains have been made through the various programmes and interventions there has been a missing link Hence, this study thus is making a strong case for the Green building concept to be included in the various national policies including the National Climate Change Policy and the Energy Policy to help mitigate and adapt to climate change and variability in order to reduce electricity end-user wastage, reduce carbon footprints and build a climate resilient environment. Adapting to the Green Building concept applies to Ghana since other African countries are making a conscious effort, more so, since it provides the opportunity for indigenous production and encourages innovation. Besides, it creates an avenue to build a resilient power system whilst fulfilling the country's international climate commitments.

Ghana National Climate Change Master Plan Action Programmes for Implementation: 2015–2020

This document seems to fuse aspects of the National Climate Change Policy (NCCP) and National Climate Change Adaptation Strategy (NCCAS), which indicates synergy in the various climate change documents. It eliminates the incidence of duplication of efforts and provides an opportunity for monitoring and evaluation, as outlined to be implemented from 2015 to 2020.

The Masterplan touches on specific actions and programmes in Ghana's various climate sensitive areas. There is budgetary allocation for programmes listed in the Masterplan.

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Programme 2.1 of the Masterplan considers developing local capacity to design climate-resilient infrastructure, while Programme 2.4 ensures that existing key infrastructure is climate-proof. Even though these are indications that buildings or infrastructure have been considered in the Masterplan, they are not necessarily Green buildings.

Furthermore, Programme 4.5 of the Masterplan talks about conserving trees through agroforestry, on-farm practices, and greening urban areas. On a close examination, this programme focuses on agroforestry and on-farming practices, while no action has been listed to achieve urban areas' greening.

Thus, if Ghana's carbon sinks are located outside the urban centres, there would be a significant challenge with air pollution, heat sinks, and other health problems since rural areas do not emit GHGs as much as urban areas. However, massive tree planting exercises would make more impact if they were encouraged in urban areas to help absorb the GHGs and curtail the time these gases stay in the atmosphere.

Programme 10.3 of the Masterplan looks at ways for low-emission and clean energy technology research, development, diffusion, deployment and transfer through encouraging more efficient end-use technologies. It is followed by Programme 10.4, which focuses on measures to reduce sectoral GHG emissions, especially in energy generation, transmission, end-use, manufacturing industries and construction, etc. Energy losses in transmission and distribution are estimated at 25 per cent, while inefficiency in the end-use of electricity is estimated at 30 per cent. Through the implementation of this Masterplan, a lot of financial and energy savings would be accrued.

As this Master Plan is scheduled for review in 2020, it would be important to know how much funding each programme received over the past five years and the estimated projected cost.

Ghana's Nationally Determined Contribution

Ghana signed and ratified the UN Paris Agreement in 2016 (EPA, 2016) as its commitment to the global climate agreement and based on its national circumstances, Ghana has put forward some mitigation and adaptation actions it intends to undertake as its nationally determined contribution (NDC) to reduce its national GHG emissions. The inclusion of both mitigation and adaptation in Ghana's Nationally Determined Contribution to the Paris Agreement (Gh-NDC) resonates with the medium-term development agenda; Ghana Shared Growth Development Agenda I and II (NDPC, 2015); the anticipated 40-year socio-economic transformational plan and the universal sustainable development goals.

In all, 20 mitigation and 11 adaptation programmes of actions in seven priority economic sectors are being proposed for implementation over the next 10 years (2020-2030). Implementing these actions will help attain low-carbon climate resilience through effective adaptation and GHG emission reduction.

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These 31 action programmes will drive the strategic focus of a "10-year post-2020 enhanced climate action plan" developed in 2015. Over the next 10 years, Ghana needs a total of USD 22.6 billion in investments from local, international public, and private sources to finance these actions. USD 6.3 billion is expected to be mobilised from local or own sources, whereas USD 16.3 billion is expected to come from international support.

It will thus be an opportunity for Ghana to make good on the Green building concept in the action programme outlined, promoting clean rural household lighting and doubling energy efficiency improvement in the country.

METHODOLOGY

This study ultimately chose qualitative methodology, which employed case studies, focus groups, interviews, and similar techniques to collect data.

This research adopts an interpretivist paradigm to examine how stakeholders understand, interpret, and implement green building concepts within Ghana's climate change policy context. Unlike positivist approaches that seek objective truths, this study acknowledges that the meanings attached to "green building" and "climate adaptation" are socially constructed through the experiences, cultural contexts, and professional backgrounds of various actors in Ghana's building sector.

The interpretivist lens allows us to explore the subjective realities of policymakers, architects, builders, and community members, recognising that their varied interpretations shape how green building concepts are translated from policy to practice. This approach is particularly valuable in the Ghanaian context, where traditional building practices, cultural values, and modern sustainability concepts intersect in complex ways that cannot be fully captured through quantitative metrics alone.

The research design employs qualitative methodologies centered on semi-structured interviews, focus group discussions, and participant observation at key sites where green building initiatives are implemented. 17 in-depth interviews were conducted with diverse stakeholders, including officials from Ghana's Environmental Protection Agency, Ministry of Environment, Science, Technology and Innovation, Ministry of Works and Housing, Ministry Energy and Green Transition, Ministry of Climate Chanage and Sustainability, Green Building Council, Ghana Institute of Architects, Ghana Institution of Surveyors, contractors, property developers, and community representatives. Focus groups brought together mixed stakeholder groups to observe how meanings are negotiated and contested when different interpretations encounter each other. Observing building projects and policy meetings contextualised how interpretations manifest in physical spaces and decision-making processes.

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Data analysis was based on hermeneutic principles, recognising that interpretations emerge through an iterative process between parts and whole. Interview and focus group transcripts went through thematic analysis using inductive and deductive approaches, identifying recurring patterns while remaining sensitive to unique perspectives. The analysis focused on the language used to describe green building concepts, exploring how terms are defined differently across stakeholder groups and how these definitions influence implementation choices. The researcher acknowledges their positionality within this interpretivist framework, using reflexive journaling to document how their background and assumptions influence the interpretation process, while triangulating findings through member checks with participants to ensure interpretations reflect participants' intended meanings.

This interpretivist research design addresses several limitations of more positivist approaches to studying climate policy implementation. By focusing on how meaning is constructed rather than measuring compliance against predetermined metrics, the study will reveal hidden barriers, cultural factors, and contextual elements that shape the adoption of green building practices in Ghana. This approach recognises that effective climate adaptation requires more than technical solutions; it demands understanding the social processes through which environmental policies gain meaning and legitimacy within specific cultural contexts.

Additionally, a broad range of secondary sources was used for the data gathering because the study's primary data sources were published literature and secondary sources. Data collection aims to gather high-quality evidence that will enable analysis to create believable and convincing responses to the study's questions (Formplus, 2020). As a result, agencies and organisations whose missions aligned with this research were chosen.

For this investigation, a non-probability method of data collection was used. The sample population was chosen with this line of reasoning in mind. Since the study's data came from a tiny purposive sample, it employed a qualitative methodology. There were seventeen people in the sample. Respondents' responses were electronically recorded and transcribed for the interview since the data was gathered through in-person and online interviews.

It was necessary to get respondents from various organisations whose mandate cut across the study area to get clarity and understand the situation regarding the Green Building concept as a strategy towards climate change mitigation and adaptation. Therefore, policy institutions, implementing agencies, professional bodies, and research institutions were contacted and interviewed to obtain crosscutting information from the players. The institutions contacted were as follows:

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a) Policy
   i. Ministry of Works & Housing
   ii. Ministry of Energy and Green Transition
   iii. Ministry of Environment, Science, Technology & Innovation (MESTI)
   iv. Ministry of Climate Change and Sustainability

b) Implementing Agencies
   i. Environmental Protection Agency (EPA)
   ii. Architectural & Engineering Services Limited
   iii. Energy Commission

c) Research Institutions
   i. Institute of Industrial Research under the Council for Scientific and Industrial Research (CSIR)
   ii. Institute of Building & Roads Research under CSIR.

d) Professional Bodies
   i. Ghana Institute of Architecture
   ii. Ghana Institution of Surveyors
   iii. Green Building Council

FINDINGS

These findings highlight the complex interplay of policy, market, and technical factors affecting Ghana's adoption of green building concepts as a climate change response strategy. While promising initiatives exist, significant challenges remain in creating a comprehensive and practical implementation framework.

Table 1: Key Stakeholder Institutions Interviewed

	Institution	How connected
1.	Ministry of Works and Housing	Existing housing policy and how it is related to Green Building
2.	Architectural and Engineering Services Limited (AESL)	Any implementation on Green Building
3.	Ghana Institute of Architects and Ghana Institution of Surveyors	Their opinion on Green Buildings, experience, opportunities and challenges
4.	Green Building Council	Are there any green building activities lined up or being rolled out? What challenges does the

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		Council face, and how can we provide financial support to roll out activities?
5.	Ministry of Environment, Science, Technology and Innovation (MESTI) & Ministry of Climate Change and Sustainability	Climate Change Policy inculcating the Green Building concept if any
6.	Environmental Protection Agency (EPA)	Climate Change Implementation and Green Buildings.
7.	Building and Road Research Institute (BRRI) of CSIR	Any local research related to Green Building and the future
8.	Institute of Industrial Research (IIR) of CSIR	Any local research related to Green Building and its importance
9.	Ministry of Energy and Green Transition	Energy Policy and benefits of Green Building in terms of energy efficiency and power generation
10.	Energy Commission	Energy efficiency activities and their relations to Green Building

These results highlight the intricate relationship between policy goals and real-world application in Ghana's attempts to embrace green building principles to respond to climate change. Although basic rules are in place, many obstacles remain to establishing efficient implementation pathways, developing technical ability, creating solutions suited for the local environment, and striking a compromise between global best practices and local realities.

"Budgetary constraints limit our ability to encourage the adoption of green buildings; we are aware of what must be done, but there are insufficient financing sources." (Ministry Official)

" Our efforts to include climate resilience into construction rules are sluggish because they require much consultation." (Building Code Committee Member)

"Government buildings should lead by example, but retrofitting existing structures is expensive and new construction often defaults to conventional methods." (Public Works Director)

"Clients perceive green features as expensive additions rather than essential elements. Education is needed to shift this mindset." (AESL)

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"Local material producers are hesitant to invest in green certification because the market demand is not consistent yet." (Local producer)

" More demonstration projects that highlight affordable green solutions suitable for Ghana's climate and economy are required." (Contractor)

"Many professionals understand the concept but lack specific technical knowledge to implement green building systems effectively." (EDGE)

"University curricula are only now beginning to incorporate green building principles—we have a generation of practitioners who need retraining." (Academic Expert)

"The few certified green buildings in Ghana relied heavily on international consultants, which is not sustainable for widespread adoption." (EDGE)

Upon completing the interviews, it was discovered that every interviewee was aware of the Green Building idea and how its application would greatly benefit their communities and, in turn, the nation.

Unfortunately, the Ministry formulated the Building Code. However, when it comes to regulation, the Ministry of Local Government is made to handle it because before a construction begins, it needs to be approved at the Assembly level under the latter ministry. Requirements must be fulfilled, including submitting reports on fire, environmental Impact Assessment (EIA) and the design according to the Building Regulations Act of 1996(LI 1630). The Ministry of Works & Housing is reviewing the Building Regulations to include aspects of the 2018 Building Code.

Architectural and Engineering Services Limited (AESL) says retrofitting buildings is achievable, but complicated designs make it more expensive. Therefore, structures that would be more expensive to maintain should not be encouraged as part of Green Building design. Green Buildings will play a significant role in climate change mitigation and adaptation. AESL has no written policy ensuring its designs are always green. However, the institute should have a policy after the EDGE certification course since the world is progressing. Therefore, the institute needs to adapt to the trends the world is moving towards.

The bilateral Renewable Energy and Energy Efficiency in the Public Sector (REEEPublic) Project, implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, seeks, among other objectives, to promote renewable energy and energy efficiency in buildings to reduce the energy costs of public institutions and to support decision-makers and administrations at the national, regional, and district levels.

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Unfortunately, most of the current building designs in Ghana are not climate-adaptive. For instance, most clients opt for glazing windows due to their alleged beauty, so it is the aesthetics rather than inviting the natural feeling of the environment or savings.

The Ghana Green Building Council identified valuable traditional building techniques with climate-responsive features that could be incorporated into modern green building practices. Efforts to document and standardise these traditional approaches are underway, but challenges are facing in gaining wider acceptance.

Council representatives emphasised limited awareness about green building concepts among developers, contractors, and the general public. Training programs for professionals have reached only a small percentage of the building industry workforce. Educational materials on green building practices appropriate for the Ghanaian context are still being developed.

Initial cost concerns dominate decision-making despite potential long-term savings from green buildings. Ghana's limited availability of certified green materials and technologies creates implementation difficulties. Interviewees noted that most green building projects are driven by international organisations rather than local market demand.

What was worrying, however, was that even though the respondents knew the benefits and importance of the Green Building concept, there was no visible sign of it being articulated in their work plans. When the respondents were probed to find out why the concept seemed to have been left out, the concept was shrouded in the term “resilient.”

Furthermore, since buildings outlive people and climate change is here to stay, one would have expected that there would be an established policy or set of guidelines for industry players in the built environment to give guidance and focus on what buildings should be constructed, the materials to be used, architectural design, energy efficiency, and environmental impact of buildings. Thus, the results supported the argument made by Ingrao et al. (2018) that buildings need energy throughout time and, as a result, need thorough environmental assessments at the design stage.

Additionally, it was discovered that most public institutions paid a penalty on their electricity bills due to outdated equipment and a lack of maintenance. This supported the findings of Williams et al. (2015), who pointed out that schools, health clinics, administrative offices, and other service sector players use more energy, which raises the facility's energy costs. For this reason, it is important to critically examine the types of equipment and appliances used and their consumption levels.

Once more, it was found that the brick moulders were gradually disappearing because of low demand for the brick-building material, even though experts were aware of the material's

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critical role and could have swiftly created policy guidelines outlining its advantages and had the financial means to build facilities that would have revived the market. It was confirmed by Tian et al. (2018) that measurement errors and ambient factors like temperature and moisture are to blame for the uncertainty ranges of the thermal characteristics.

Additionally, the interview revealed that Ghana needs a plan to create smart cities. In contrast to urban planners, who would critically examine the city's structure, including its climatology, urban designers are required. Furthermore, Ghana must construct structures that reflect Ghanaian culture and lifestyle, not just traditional ones.

Green Building Framework

The integrated framework for adopting green buildings and putting Ghana's climate change policy into practice is depicted in this network diagram. Figure 1 indicates the framework that includes the following important elements:

The National Climate Change Policy, Building Regulations, and Energy Efficiency Codes are all part of the policy framework. This agrees with the findings of Skillington et al. (2022), who found that voluntary instruments dominate the policy landscape, with regulatory measures largely absent at national levels and confined to inconsistent application across lower levels of governance. Ghana Green Building Council, Ministry of Works & Housing, and Ministry of Environment all form stakeholder engagement.

The technical solution comprises Climate Resilience, Sustainable Materials, and Energy Efficiency. The finding was supported by the study of Ahmadizadeh et al. (2024), which emphasised materials like bamboo, aerogels, and photovoltaic-integrated surfaces while stressing the criticality of insulation, not just for temperature regulation but also for reducing energy consumption and enhancing overall building efficiency. The financial mechanisms comprise climate funds, green loans, and tax incentives, which were supported by Akomea-Frimpong et al. (2022), establishing the linkage between the concept of green finance and green buildings. It was also supported by Cui et al. (2020), who argued that the integrity of the green financial system positively impacts sustainability developments and cleaner production.

In order to provide financial capacity for reducing greenhouse gas emissions globally, One hundred and ninety-four (194) countries created the Green Climate Fund (GCF) in 2010 (Cui et al., 2020). In order to sustain the concept's increasing appeal on a global scale, the fund aimed to assist and encourage green finance initiatives.

This network method highlights that the strength of the links between components is just as important to successful implementation as the components themselves. The framework illustrates the need for climate change policies to promote the adoption of green construction principles in Ghana through some interrelated channels.

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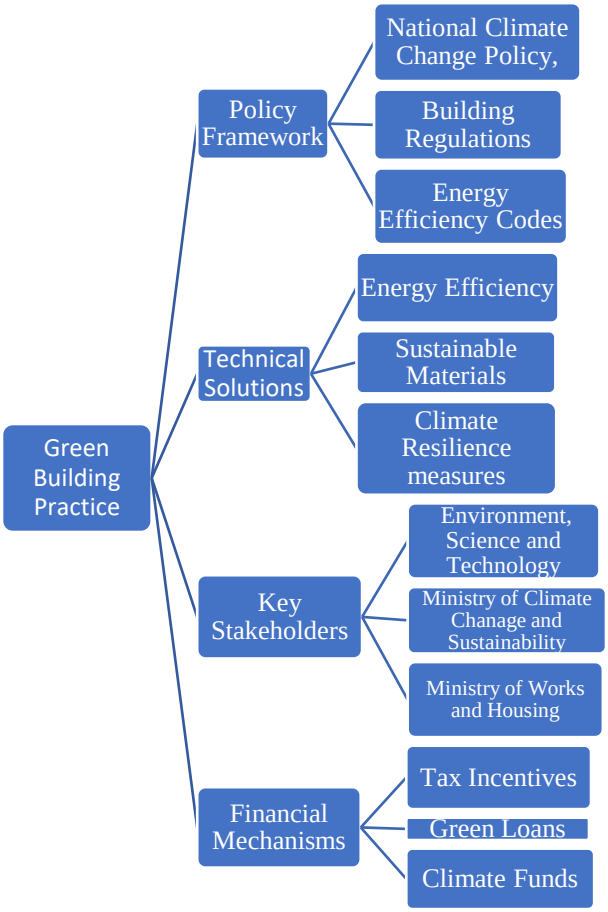

Figure 1: Ghana's Climate Change Mitigation and Adaptation policies on Green Building Framework

DISCUSSION

Ghana's built environment has advanced significantly in recent years, and the country's goal to become a developed nation by 2057, 100 years after gaining independence, only portends the impending transformation, given the anticipated increase in population and the ensuing need for housing and infrastructure.

Integrating adaptation and mitigation in the nation's built environment through green buildings is necessary to lessen the effects of climate change and variability and enable simple and adaptable adjustments when necessary. This is in line with Misra (2014), who suggests creating efficient adaptation and mitigation policies and strategies to lessen the effects of climate change. A national strategy like this will also guarantee that the economy is steady and favorable enough to draw in investment.

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Other African nations are actively working to implement the green building concept, which is fostering innovation and creativity by using recycled and raw resources to produce livable, long-lasting homes for their citizens. Thus, Ghana can embrace and integrate the Green Building concept into its medium-to-long-term economic development strategies. Ikram et al. (2021) contend that to create a low-carbon society, it is necessary to identify the development priority and implement the appropriate measures.

As explained in this paper, Ghana is making numerous efforts to adapt to and mitigate the effects of climate change. Unfortunately, there is no long-term national climate change adaptation and mitigation strategy because these activities are not coordinated. This supports the findings of Adenle et al. (2017) that the adaptation response has been sparse, dispersed, disconnected from national planning procedures, and has not fully incorporated local knowledge.

Additionally, the nation's National Climate Change implementation depends on foreign aid for funding, which could cause delays. Implementation would be postponed or halted if donor funding were to be released later, suspended, or canceled. This result supports the findings of Adenle et al. (2017), who noted that governments' capacities are challenged by adaptation finance's access procedures and inadequacy. Therefore, before considering other donor considerations, the government must design implementation schedules primarily based on the nation's financial resources.

Given that initiatives like the energy efficiency programs that support the Green Building concept have already been implemented, Ghana would surely gain from carefully considering the idea. Many green building technologies are already on the market that may be used to promote the idea of green buildings in the nation, and this should also be noted. Instead of using a one-size-fits-all approach, people should support and welcome local ingenuity and invention when implementing the green construction concept.

Once more, examining how the public is informed about climate change challenges is crucial. Instead of using difficult-to-explain terms like greenhouse gases, carbon sink, etc., it would be simpler to communicate in a way that the general public can relate to and strive for. To accomplish their goals, the government organisations in this field should also be willing and able to collaborate with the Ghanaian Green Building Council. Given that many of the current national policies are up for review, there is a chance that the Green Building concept will be included in all of them. This is especially advantageous because it aligns with the nation's efforts to meet the Sustainable Development Goals (SDGs) by 2030.

As a result, the nation needs to foster a culture of cross-learning; organisations and institutions need to train one another since their combined roles affect one another. Knowledge is exchanged and abilities are built in this way, but more significantly, it facilitates the process of

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working toward a shared objective. Last, clients should choose their building designs thoughtfully rather than mindlessly replicating those in temperate regions.

CONCLUSION

This research paper's primary goal was to support Ghana's need to use the Green Building concept as one of its mitigation and adaptation plans for climate change. Assessing Ghana's climate policies and how they align with the Green Building concept, examining the relationship between the Green Building concept, climate change, and climate variability, and highlighting the necessity of Ghana implementing the Green Building concept as part of its mitigation and adaptation strategy are the three sub-objectives.

These objectives have been assessed by reviewing existing climate change policies in Ghana. Even though some policies have actions toward climate resilience, it is important to have a vehicle through which the actions could be carried out for easy monitoring and evaluation. This study is incomplete without outlining the benefits that could be derived from applying the Green building concept.

The first advantage is ecological. In urban environments, the green building concept promotes flora growth, upkeep, and garbage recycling, all of which are climate-appropriate; the greenery serves as a sink that absorbs carbon and produces oxygen. Recycling also saves electricity, water, and other resources.

The second benefit is economic, since measures like energy and water savings correspondingly result in financial savings owing to payment in reduced utility bills. Another significant economic benefit is the new job opportunities created by this new building initiative.

The last advantage is the social influence on society as a whole. Buildings can have a beneficial or bad impact on a person, affecting their productivity and overall well-being. Additionally, areas with much greenery are proven to enhance outdoor air quality and foster resilient biodiversity.

Targeted support is essential for suppliers of sustainable building materials, effective equipment vendors, and green technology providers to guarantee the market availability of components needed to implement green building concepts.

This study considers Ghana's climatic, economic, and cultural circumstances to develop locally relevant indicators and implementation strategies. It thoroughly investigates how Ghana's national climate policies, local implementation strategies, and municipal building laws interact, highlighting important coordination issues and undiscovered opportunities.

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